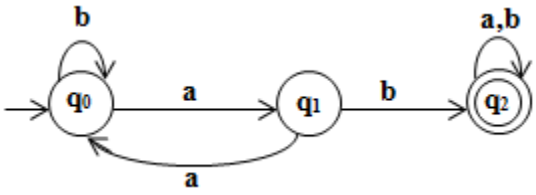
THEORY OF COMPUTATION
SET-8

1. Regular Expression for this DFA:



(a) (b + aa)* ab(a + b)*
(b) b*a (ab*a)* b(a + b)*
(c) Both (a) and (b)
(d) b* ab(a + b)*

2. Consider this regular expression:

r.e. = (a*a)b + b

What is the language?

(a) All the strings ending with b
(b) Any string of 1 or more a's followed by single b
(c) Any string of 0 or more a's followed by single b
(d) None of above

3. Consider 2 regular expression:

i. $\phi^* + a^+ + b^+ + (a + b)^+ \rightarrow r_1$
ii. $\phi^+ + a^* + b^* + (a + b)^* \rightarrow r_2$

(a) $L(r_1) = L(r_2)$
(b) $L(r_1) \subseteq L(r_2)$
(c) $L(r_1) \supseteq L(r_2)$
(d) None of above

4. Consider this regular expression:

r = (a*b)* + (b*a)*

This is equivalent to

(a) (a + b)*
(b) $(a + b)^* \cdot (ab)^+ + (a + b)^* (ba)^+$
(c) (a + b)*a + (a + b)*b
(d) None of above

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5. Consider this language:

$$L = \{a^n bc^m \mid n > 1, m \leq n\}$$

over $\Sigma = \{a, b, c\}$ is

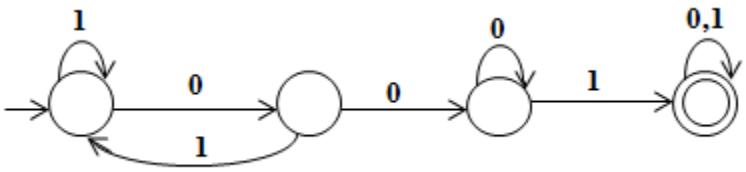
(a)Not decidable
(b) Language is unambiguous
(c)Language is NCFL
(d) Language is DCFL

(e) Both (b) and (d)

6. Let A and B be disjoint, R.E. languages. Let $\overline{A \cup B}$ also be recursive enumerable. What can you say about A and B?

(a) Neither A nor B is decidable is possible
(b) At least one among A and B is decidable
(c) Both A and B are decidable
(d) None of above

7. Consider this DFA:



S denotes set of seven bit binary strings in which first, fourth, last bit is 1. Number of strings in L are:

(a) 5
(b) 6
(c) 7
(d) 8

8. Following language:

$$L = \{a^n b^n c^n d^n, n \geq 1\} \text{ is}$$

(a) CFL but nor regular
(b) CSL but not CFL
(c) Regular
(d) Type 0 language but not Type 1

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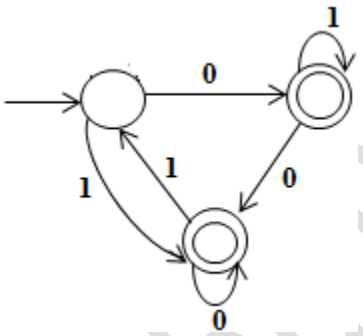
9. Consider these languages:

$L_1 = \{S \in (0 + 1)^* \mid n_0(S) + n_1(S) \leq 4\}$
$L_2 = \{S \in (0 + 1)^* \mid n_0(S) - n_1(S) \leq 4\}$

(a) Both are regular
(b) Both are non-regular
(c) L_1 is regular but L_2 is not
(d) L_1 is not regular but L_2 is regular

10. Which string is not accepted by FSA?



(a) 00111
(b) 01010
(c) 00110
(d) 11010

11. Can a Deterministic Finite State machine simulate a Non-Deterministic Finite State machine?

(a) No
(b) Yes
(c) Sometimes
(d) Depends on NFA

12. Which of the following is True for any Language L?

(a) $L^* = \bigcup_{i=1}^{\infty} L^i$
(b) $L^* = L^+ \cup \{\varepsilon\}$
(c) $L^* = L^+$
(d) $L^* = L^+ \cap \{\varepsilon\}$

13. Concept of Grammar is used in which part of compiler?

(a) Lexical analysis
(b) Parser
(c) Code generation
(d) Code optimization

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14. (a + b) (cd)* (a + b) denotes the following set:

(a) $\{a\ (cd)^n\ b, n \geq 0\}$
(b) $\{a\ (cd)^n\ a, n \geq 0\} \cup \{b\ (cd)^n\ b, n \geq 0\}$
(c) $\{a\ (cd)^n\ a, n \geq 0\} \cup \{b\ (cd)^n\ b, n \geq 0\}$
$\cup \{a\ (cd)^n\ b, n \geq 0\} \cup \{b\ (cd)^n\ a, n \geq 0\}$
(d) $\{ac^nd^nb, n \geq 1\}$

15. Consider this:

i. $b^*a^* \cap a^*b^* = a^* \cup b^*$
ii. $a^*b^* \cap c^*d^* = \phi$

(a) Both are True
(b) Both are False
(c) (i) is True and (ii) is False
(d) (i) is False and (ii) is True

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